CLAIMS

What is claimed is:

1. An apparatus for spectral interferometry, said apparatus comprising an interferometer comprising a light source and an element dithered to provide a continuous relative phase shift between target and reference arms of the interferometer.

2. The apparatus of claim 1 wherein said light source is mode locked.

3. The apparatus of claim 1 additionally comprising means for subtracting spectra that differ by said phase shift to create a differential spectral interferogram.

4. The apparatus of claim 3 additionally comprising means for performing a Fourier transform of said differential spectral interferogram, whereby an amplitude of a signal of interest is improved by a factor of approximately two as compared to non-differential spectral interferometry.

5. The apparatus of claim 1 additionally comprising means for determining both real and imaginary components of a complex interferogram.

6. The apparatus of claim 5 wherein said means for determining substantially removes 1/f noise.

7. The apparatus of claim 1 wherein said element comprises a piezo translator.

8. The apparatus of claim 1 additionally comprising a detector providing lock-in detection for each of one or more pixels.

9. The apparatus of claim 1 wherein said phase shift is approximately π.

10. The apparatus of claim 1 wherein said apparatus substantially rejects 1/f noise.

11. The apparatus of claim 1 wherein said apparatus substantially rejects low frequency noise.

12. The apparatus of claim 1 wherein said apparatus substantially reduces detection bandwidth.

13. The apparatus of claim 1 wherein said apparatus employs synchronous detection.

14. The apparatus of claim 13 wherein said synchronous detection comprises lock-in detection.

15. An apparatus for spectral interferometry, said apparatus comprising:

an interferometer comprising a light source and an element dithered to provide a continuous relative phase shift between target and reference arms of the interferometer; and

a detector providing synchronous detection for each of one or more pixels.

16. An apparatus for spectral interferometry, said apparatus comprising:

an interferometer comprising a light source and an element providing a relative phase shift between target and reference arms of the interferometer; and

a detector providing synchronous detection for each of one or more pixels.

17. A method for spectral interferometry, the method comprising the steps of:

providing an interferometer comprising a light source; and

dithering an element to provide a continuous relative phase shift between target and reference arms of the interferometer.

18. The method of claim 17 wherein the light source is mode locked.

19. The method of claim 17 additionally comprising the step of subtracting spectra that differ by the phase shift to create a differential spectral interferogram.

20. The method of claim 19 additionally comprising the step of performing a Fourier transform of the differential spectral interferogram, whereby an amplitude of a signal of interest is improved by a factor of approximately two as compared to non-differential spectral interferometry.

21. The method of claim 17 additionally comprising the step of determining both real and imaginary components of a complex interferogram.

22. The method of claim 21 wherein the determining step substantially removes 1/f noise.

23. The method of claim 17 wherein the element comprises a piezo translator.

24. The method of claim 17 additionally comprising the step of providing lock-in detection for each of one or more pixels of a detector.

25. The method of claim 17 wherein the phase shift is approximately π.

26. The method of claim 17 wherein the method substantially rejects 1/f noise.

27. The method of claim 17 wherein the method substantially rejects low frequency noise.

28. The method of claim 17 wherein the method substantially reduces detection bandwidth.

29. The method of claim 17 additionally comprising the step of employing synchronous detection.

30. The method of claim 29 wherein the employing step comprises employing lock-in detection.

31. A method for spectral interferometry, the method comprising the steps of:

providing an interferometer comprising a light source;

dithering an element to provide a continuous relative phase shift between target and reference arms of the interferometer; and

providing lock-in detection for each of one or more pixels of a detector.

32. A method for spectral interferometry, the method comprising the steps of:

providing an interferometer comprising a light source;

employing an element to provide a relative phase shift between target and reference arms of the interferometer; and

providing lock-in detection for each of one or more pixels of a detector.